THE FOLIOSE AND FRUTICOSE LICHEN FLORA OF THE OHIO RIVER VALLEY BETWEEN GALLIPOLIS, OHIO, AND PARKERSBURG, WEST VIRGINIA

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ABSTRACT

Lichens were surveyed in a relatively uncollected region composed of parts of Gallia, Meigs, Athens, and Washington Counties, Ohio, and parts of Mason, Jackson, and Wood Counties, West Virginia. A total of 87 species of foliose and fruticose lichens were recorded. New state records for West Virginia are *Cetraria fendleri, Parmelia crozalsiana, P. flaventior, Parmeliopsis aleurites, Physcia adscendens, P. endococcinea,* and *P. lacinulata. Pseudevernia consocians* was the only new species found in Ohio.

INTRODUCTION

In many regions, published lists of lichen floras are lacking or at best are very incomplete. Ohio is indeed fortunate to have the fine work of Conan J. Taylor (1967, 1968); however, even in these publications some parts of the state remain poorly characterized. One such region is the Ohio River valley between Gallipolis, Ohio, and Parkersburg, West Virginia. This area contains parts of Gallia, Meigs, Athens, and Washington Counties in Ohio and parts of Mason, Jackson, and Wood Counties in West Virginia (fig. 1). Records for the Ohio counties (Taylor, 1967, 1968) indicate that, of the counties listed above, Washington County has listed the greatest number of foliose and fruticose species and Meigs County the least, with totals of 44 and 14, respectively. In contrast, Hocking County, one county to the west, has listed 75 foliose and fruticose species. In adjacent West Virginia the last comprehensive record of lichens was by J. L. Sheldon (1939). His paper lists four species of foliose and fruticose lichens for Mason County, none for Jackson County, and one questionable entry for Wood County. A more recent paper by Thomson (1963) includes several species of *Physcia* from West Virginia. It was as a result of the inadequate record for this region that the present study was undertaken.

All of the area studied (fig. 1) lies within the unglaciated Allegheny Plateau. The topography is fairly uniform throughout, characterized by 300- to 400-foot hills and broken only by the valley of the Ohio River with its floodplain. At present, the area is largely wooded, with the cleared land generally in pasture or meadow. The regional climax vegetation in Ohio is predominantly mixed-oak and beech-maple forests, with small areas of oak-sugar maple and mixed mesophytic forests (Gordon, 1966). Similar types are present in West Virginia, as confirmed by my field observation. Little crop farming is done, except on the Ohio River floodplain, probably because of the steep slopes and poor soil. Strip mines are evidence of past and present coal-mining activities in Pennsylvanian-age strata. Very little industry is present in the area, although several factories and two power-generating plants are located along the Ohio River between Gallipolis, Ohio, and Parkersburg, West Virginia.

Many different habitats for lichens can be found in this region. A variety of tree species, growing in many different light and moisture conditions, is present. Soil habitats occur as oldfields, soil banks beside roads, oldstrip-mine banks, and hillsides covered by open woods. Sandstone outcrops are scattered throughout the area, although they are not abundant anywhere. Perhaps the most unusual type of lichen habitat studied was found in cemeteries; the porous sand-

[1]Manuscript received April 2, 1973.

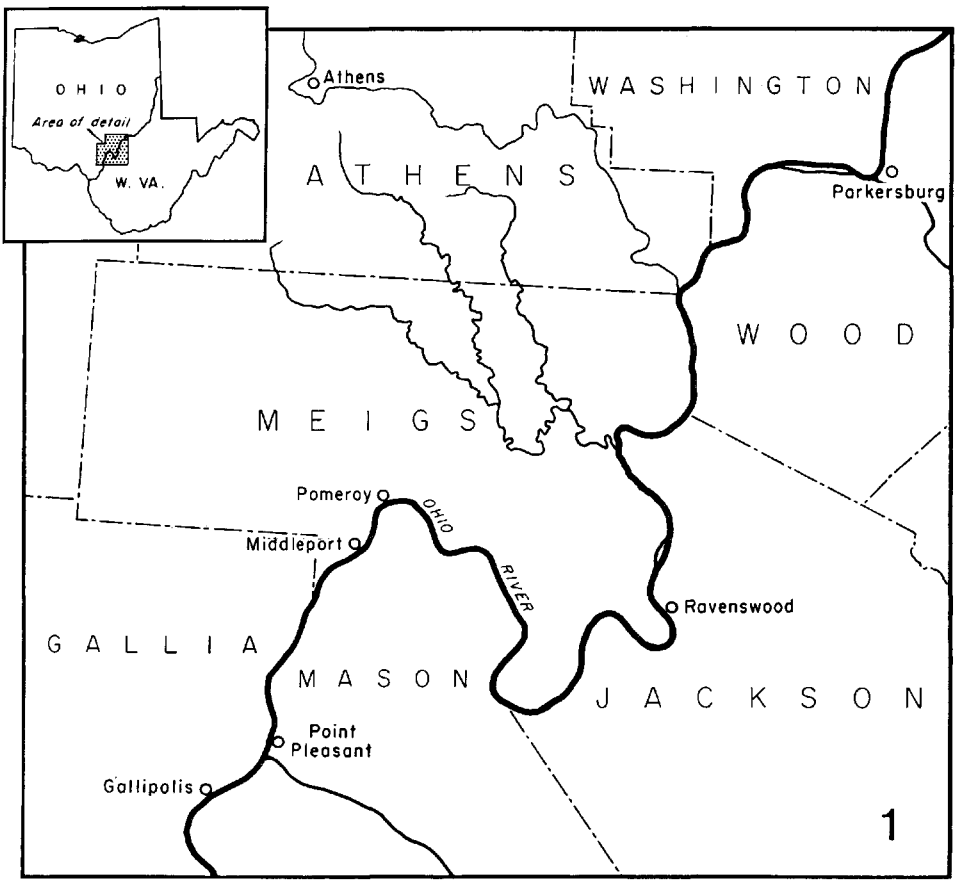


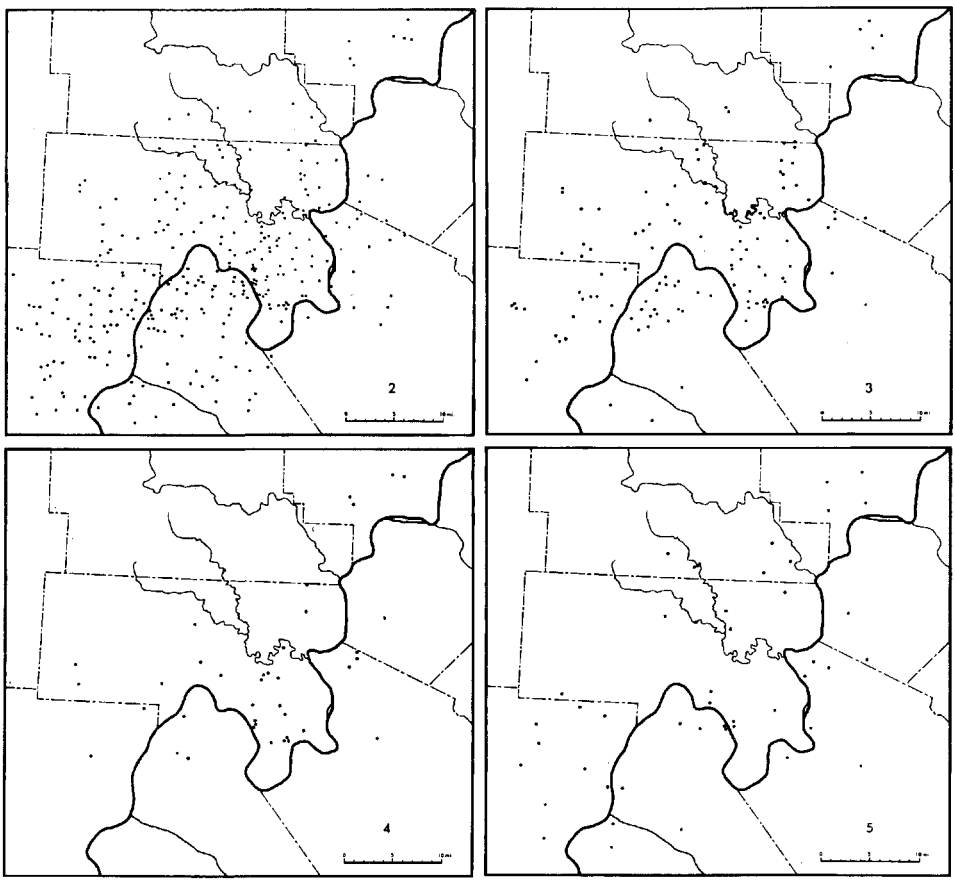
FIGURE 1. Map of the area covered in this study. Inset shows the position of the study area in the states of Ohio and West Virginia.

stone and marble headstones and bases have a characteristic lichen flora. The different habitats in which lichens were found are described in greater detail below.

METHODS

In an attempt to record the lichens from as many different habitats as possible, specimens were collected from 350 locations scattered throughout the study area. These locations can be roughly categorized by substrate; trees—294 sites, soil—115 sites, rock—36 sites, and tombstones—44 sites (figs. 2–5). The apparent discrepancy in total number arises from the fact that some locations contained more than one type of substrate; for example, a cemetery with trees, or a woods with tree, soil, and rock substrates. Most of the locations were near one of the secondary roads, but some could be reached only by considerable walking.

Some lichen identification was done in the field; however, if any doubt existed, a specimen was taken to the laboratory for microscopic examination and chemical testing. Taxonomic references used were those of Hale (1969), Taylor (1967, 1968), and Thomson (1967); nomenclature follows that of Taylor. Specimens difficult to identify were verified by Dr. Mason E. Hale, Jr., U.S. National Herbarium. A collection of voucher specimens has been deposited in The Ohio State University lichen herbarium.



FIGURES 2–5. Locations of collection sites within the study area. Tree sites (fig. 2), soil sites (fig. 3), rock sites (fig. 4), and cemetery sites (fig. 5).

RESULTS AND DISCUSSION

A total of 87 species of foliose and fruticose lichens were found. These species, together with the substrates on which they were generally found and the counties in which they were collected, are listed in table 1. In an attempt to give some idea of abundance, the number of locations in which a species was found is also listed. In general, the species collected conform very well to the distribution and substrate notes of Taylor (1967, 1968).

Several species, however, deserve individual comment. *Parmelia crozalsiana* is apparently more common and *P. galbina* less common than might be expected from Taylor's published material. *Physcia adscendens* and *Xanthoria fallax*, thought by Taylor (1967) to be rare and scattered in southeastern Ohio, were relatively common in this area and were found almost exclusively on cemetery headstones. In this study, many new county records (table 1) and several new state records were established. Species previously not reported from West Virginia are *Cetraria fendleri*, *Parmelia crozalsiana*, *P. flaventior*, *Parmeliopsis aleurites*, *Physcia adscendens*, *P. endococcinea*, and *P. lacinulata*. *Pseudevernia consocians* was the only new state record for Ohio.

TABLE 1

Foliose and fruticose lichen species collected[1]

	Ohio				W. Va.				
	Gallia	Meigs	Athens	Washington	Mason	Jackson	Wood	Total number of sites recorded	Substrate
Alectoria nidulifera Norrl.		N						2	T
Anaptychia granulifera (Ach.) Mass.	N	N		N	N			8	T
A. hypoleuca (Muehl.) Mass.	N	N			N			15	T
A. obscurata (Nyl.) Vain.	x	N	N	N	N	N	N	23	T
A. palmulata (Michx.) Vain.		N	N					4	T,R
A. speciosa (Wulf.) Mass.	x	N	x	x	N	N	N	34	T,R
Baeomyces absolutus Tuck.			x					1	R
B. roseus Pers.	N	N	x					4	S
Candelaria concolor (Dicks.) B. Stein	x	N	N	N	N	N	N		T
C. fibrosa (Fr.) Muell. Arg.	N							1	R
Cetraria ciliaris Ach.	N	N			N	N		10	T
C. fendleri (Nyl.) Tuck.		N			N			3	T
C. oakesiana Tuck.		N						1	T
C. tuckermanii Oakes		N						1	T
Cladonia apodocarpa Robb.	x	N		x	N	N	N	27	S
C. arbuscula (Wallr.) Rabenh.		N						1	S
C. bacillaris (Ach.) Nyl.		N	N	N	N	N		12	S,T
C. caespiticia (Pers.) Floerke	N	N						3	T
C. capitata (Michx.) Spreng.	N	N	N	x	x	N	N	37	S
C. caroliniana (Schwein.) Tuck.	N	N						2	S
C. clavulifera Vain.	N	N	N	N	N	N	N	26	S
C. coniocraea (Floerke) Spreng.	N	N	x	N	N	N	N	61	S,T
C. conista (Ach.) Robb.	x	N			N			9	S
C. cristatella Tuck.	N	x	x	x	N	N	N	105	S,T
C. cylindrica (Evans) Evans	N	N			N	N		28	S,T,
C. furcata (Huds.) Schrad.	x	N	x	x	x			47	S
C. mateocyatha Robb.	N							1	S
C. nemoxyna (Ach.) Nyl.	N	N			N			4	S
C. piedmontensis Merr.	N	N		x		N		6	S
C. pleurota (Floerke) Schaer.		N						2	S
C. pyxidata (L.) Hoffm.	N	N		x	N	N		22	S,T
C. pyxidata complex—including *C. chlorophaea* (Floerke) Spreng., *C. cryptochlorophaea* Asah., and *C. grayi* Sandst.	x	x	x	x	x	x	x	65	S,T
C. rangiferina Wigg.	N	N		N	N			27	S
C. squamosa (Scop.) Hoffm.	N	N	x	N	N		N	23	S,R
C. strepsilis (Ach.) Vain.	N	N						4	S
C. subcariosa Nyl.	N	N		x	N			27	S
C. subtenuis (Abb.) Evans	x	N	x	x	N			23	S
C. verticillata (Hoffm.) Schaer.	N	x	x	x	x	N	N	51	S
Collema subfurvum (Muell. Arg.) Degel.		N		N				4	R
Dermatocarpon fluviatile (G. Web.) Th. Fr.	N	x		x	N	N	N	16	R
Hypogymnia physodes (L.) Nyl.		N			N			4	T
Lasallia papulosa (Ach.) Llano	x	x						4	R
Leptogium cyanescens Tuck.		N		N	N			5	R
L. juniperinum Tuck.		N						3	R
L. lichenoides (L.) Zahlbr.		N		N		N		4	R
Parmelia aurulenta Tuck.	x	N	x	x	N	N	N	86	T,R
P. bolliana Muell. Arg.		N	N		N			4	T
P. caperata (L.) Ach.	x	x	x	x	N	N	N	241	T,R

TABLE 1—*Continued*

	Ohio				W. Va.				
	Gallia	Meigs	Athens	Washington	Mason	Jackson	Wood	Total number of sites recorded	Substrate
P. crozalsiana Harm.	N	N	N	N	N			40	T
P. dissecta Nyl.	N	N						6	T
P. flaventior Stirt.						N		1	T
P. galbina Ach.	x	x	x		N	N		10	T
P. hypotropa Tayl.	x	x	x		N	N	N	103	T
P. livida Tayl.	x	x	x	N	N	N	N	62	T
P. plittii Gyeln.	N	N		N	N	N	N	20	R
P. rudecta Ach.	N	N	x	x	N	N	N	226	T,R
P. saxatilis (L.) Ach.	x	N			N	N	N	12	T
P. stuppea Tayl.		N						2	T
P. subaurifera Nyl.		N						2	T
P. subrudecta Nyl.	x	x	x	x	N	N	N	149	T
P. sulcata Tayl.	x	N		x	N	N	N	33	T
P. taractica Kremp.		N						3	R
P. ulophyllodes (Vain.) Sav.				N				1	T
Parmeliopsis aleurites (Ach.) Nyl.	N	N	N	N	N	N	N	19	T
Peltigera canina (L.) Willd.	x	N	N		N			14	S
P. evansiana Gyeln.		N						1	S
P. horizontalis (Huds.) Baumg.	N							1	S
P. polydactyla (Neck.) Hoffm.					N	N		2	S
P. praetextata (Somm.) Vain.		N		N				4	S,R
Physcia adscendens (Fr.) Oliv.		N	N	N	N	N	N	16	C
P. aipolia (Ehrh.) Hampe	N	x		x	N			8	T
P. ciliata (Hoffm.) Du Reitz	N	N		N	N	N	N	9	T
P. endococcinea (Koerb.) Th. Fr.	N	N			N			6	C
P. grisea (Lam.) Zahlbr.	x	N	N	x	N	N	N	28	T,C
P. lacinulata Muell. Arg.						N		1	T
P. millegrana Degel.	x	N	x	x	N	N	N	246	T,C
P. orbicularis (Neck.) Poetsch	x	N	x	x	N	N	N	107	T,R,C
P. stellaris (L.) Nyl.	N	N	N	x	N	N	N	53	T
P. syncolla Tuck.	N		N		N			6	T
P. tribacoides Nyl.	x	N	x	N	N	N	N	52	T,C
Pseudevernia consocians (Vain.) Hale & Culb.		N						1	T
Pycnothelia papillaria (Ehrh.) Duf.		N						2	S
Pyxine caesiopruinosa (Nyl.) Imsh.	x	N		x	N	N	N	39	T
P. sorediata (Ach.) Mont.	x	N	x	x	N	N	N	73	T
Umbilicaria mammulata (Ach.) Tuck.		x						1	R
Usnea strigosa (Ach.) A. Eat.		N						2	T
Xanthoria fallax (Hepp.) Arn.	N	N	N	N	N	N	N	18	C

[1]Symbols: x, confirmation of an existing county record; N, new county record; T, tree; S, soil; R, rock; and C, cemetery.

Substrate Habitats

As one becomes acquainted with lichens, certain associations of lichens and habitat can be recognized in the field. In the following paragraphs, typical substrate habitats are described, together with the lichens commonly found in them. In the field each habitat is generally not a distinct and separate entity, but rather forms a continuum with other habitats. For instance, moist woods on a north-facing slope generally grade into dry open woods on a ridge top and on the adjacent

south-facing slope. In the interest of simplicity and brevity only the most common habitats and associated species are discussed.

Moist-tree substrate. Moist-tree habitats are found at the edges of fairly dense woods, or along streams. Characteristic species are *Parmelia aurulenta, P. subrudecta, Physcia millegrana, P. orbicularis,* and *P. stellaris* on trunks, and *Cladonia bacillaris, C. coniocraea,* and *C. cylindrica* on the bases of trees. Lichens are generally not found on tree trunks in the centers of dense woods, but may be present in the crown. The upper limbs of recently felled trees are excellent places to collect lichens, and uncommon species are sometimes found on these sites. Species collected from tree crowns during the course of this study include *Alectoria nidulifera, Cetraria oakesiana, Hypogymnia physodes, Parmelia stuppea, Pseudevernia consocians,* and *Usnea strigosa.*

Dry-tree substrate. Dry-tree habitats are present in open woods, usually on a south- or west-facing slope, and as roadside trees. Species commonly found are *Anaptychia obscurata, A. speciosa, Parmelia caperata, P. hypotropa, P. livida, P. rudecta, P. subrudecta, P. sulcata, Physcia grisea, P. millegrana, P. tribacoides, Pyxine caesiopruinosa,* and *P. sorediata.*

Pine groves. Relatively dense stands of Virginia pine (*Pinus virginiana*) occur in several places in the study area. These stands are especially interesting, because the lichen species are very consistent from location to location. *Anaptychia hypoleuca, Cetraria ciliaris,* and *C. fendleri* are usually found on dead lower branches, and *Parmelia rudecta* and *Parmeliopsis aleurites* are found on a few trunks.

Moist-soil substrates. Moist-soil habitats are found at the edges of woods and on shaded roadside banks. Species commonly present in these locations are *Cladonia apodocarpa, C. bacillaris, C. coniocraea, C. cristatella, C. cylindrica, C. furcata,* members of the *C. pyxidata* complex, *C. squamosa,* and species of *Peltigera.* These lichens commonly grow among mosses on the ground, and some can also be found on tree bases and rotting logs.

Dry-soil substrates. Roadside banks, old strip-mine areas, power-line cuts, and abandoned farm land provide good locations for *Cladonia capitata, C. clavulifera, C. cristatella, C. piedmontensis,* members of the *C. pyxidata* complex, *C. rangiferina, C. strepsilis, C. subcariosa, C. subtenuis,* and *C. verticillata.* Less common species found in this habitat are *Baeomyces roseus* and *Pycnothelia papillaria.*

Moist-rock substrates. Moist-rock habitats can be found in moist wooded areas, in ravines, and along small streams. These rocks, which are generally sandstone, are in places covered with patches of thin soil and may have mosses growing over them. Lichens found in this type of habitat are species of *Collema* and *Leptogium, Dermatocarpon fluviatile, Parmelia aurulenta, Physcia orbicularis,* and species of *Peltigera.*

Dry-rock substrates. Relatively dry exposed sandstone outcrops are found in dry woods, in pastures, and along roadsides. Characteristic species are *Anaptychia speciosa, Parmelia caperata, P. plittii,* and *P. rudecta.* Less common species found are *Baeomyces absolutus, Lasallia papulosa, Parmelia taractica,* and *Umbilicaria mammulata.*

Cemetery sites. Sandstone and marble headstones are unusual places from which to collect lichens. *Parmelia caperata, P. rudecta, Physcia adscendens, P. aipolia, P. endococcinea, P. millegrana, P. orbicularis, P. tribacoides,* and *Xanthoria fallax* are species which were found on many headstones.

No definite overall patterns of distribution were noted within the area studied. Lichens which were present in any quantity appeared to be scattered throughout the area, whereas others were limited by the location of suitable substrates; *e.g., Lasallia papulosa* and *Umbilicaria mammulata* were found only on dry sandstone outcrops. The lichen flora of the Ohio River floodplain consists of only the most common species—generally *Physcia millegrana, P. orbicularis, Parmelia rudecta,*

and in a few places *P. caperata*, *P. aurulenta*, and *P. subrudecta*. Several factors appear to be the cause of this restricted list.

1. The area is heavily farmed, and most of the trees have been removed.
2. The trees that are relatively abundant—silver maple (*Acer saccharinum*), box elder (*A. negundo*), sycamore (*Platanus occidentalis*), and river birch (*Betula nigra*)—typically do not support a rich lichen flora, even when they are found on higher ground.
3. The immediate Ohio River area may be too moist for many lichens. The imperfect crustose lichen *Lepraria* sp. is common here, and it is an indicator of extremely moist habitats.

In conclusion, this study, done in an area where past collecting and published records have been sparse to nonexistent, revealed many new county records. New state records for West Virginia include: *Cetraria fendleri*, *Parmelia crozalsiana*, *P. flaventior*, *Parmeliopsis aleurities*, *Physcia adscendens*, *P. endococcinea*, and *P. lacinulata*. It is a tribute to earlier Ohio workers that only one new state record, *Pseudevernia consocians*, was established for Ohio. No distinct patterns of lichen distribution were noted within the area, individual species simply occurring where favorable substrates were available. Species in West Virginia were for the most part the same as those in Ohio. It is hoped that this small study of Ohio-West Virginia lichens will stimulate others to explore similar uncollected areas.

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This is the fourth in a series of bibliographies of Ohio geology, all published by the Ohio Geological Survey. The first, its Bulletin 52, covered the period 1819–1950. The next three were published as Information Circulars: No. 32 for the period 1951–1960, No. 36 for 1961–1965, and the present one, No. 37, for 1966 through December 1970. Copies of the earlier bibliographies are also still available from the Survey.

The bibliography, like those of the U.S. Geological Survey, has two parts: a list of references and a subject index. The reference format is in the style of the U.S.G.S., and a list of citation abbreviations is given on page 1, so all references are easily understood. Unpublished theses and dissertations are included in the entries. A county map of Ohio on page 2 provides handy reference to areas. Articles are indexed by the principal subject matter and by the area of the state covered. Some of the usual and inevitable typographical errors can be found (Webers, 1966, has the wrong year for the Abstracts issue of its reference—should be 1965, not 1955—and Yochelson got misspelled twice in the index, as Yockelson, on pages 33 and 46), but in general the bibliography appears relatively free of them.

In scanning the entries, several worthwhile features are particularly outstanding. The author's name is in capital letters for easier rapid scanning, and the date of publication of the entry is easily seen because it is indented from the author's name. The body of the citation is then indented from the date. An added feature of some of the citations is a source (or sources) for an abstract of the publication, along with the primary reference. To locate those, presumably *Abstracts of North American Geology* and *Geophysical Abstracts* were searched as a routine means of locating literature for inclusion.

The bibliography will be of use to researchers, earth science teachers, consultants, land-use planners, and others needing information on Ohio geology and mineral resources. As with the earlier bibliographies in this series, this one is a "must" in order to keep current with the subject.

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